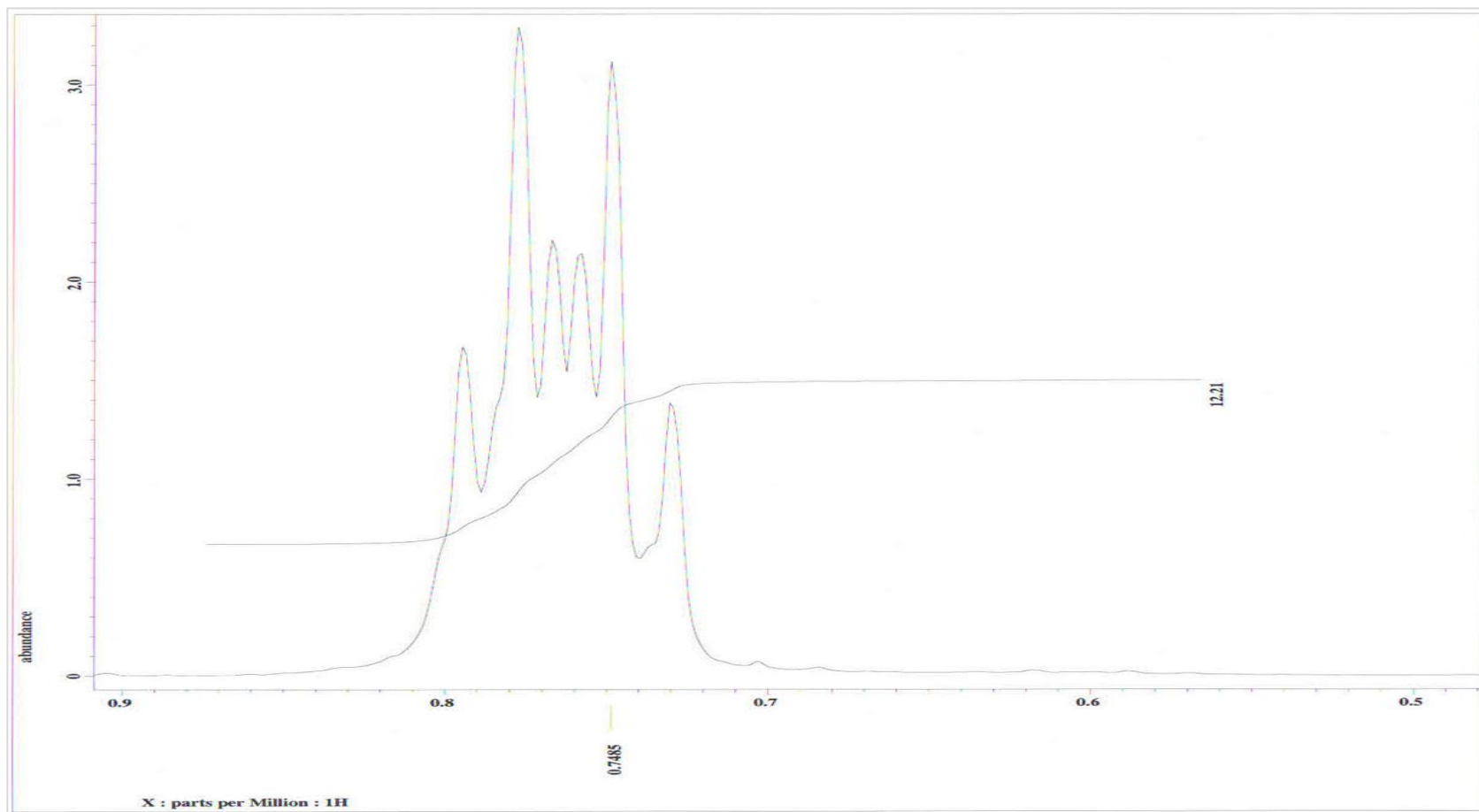
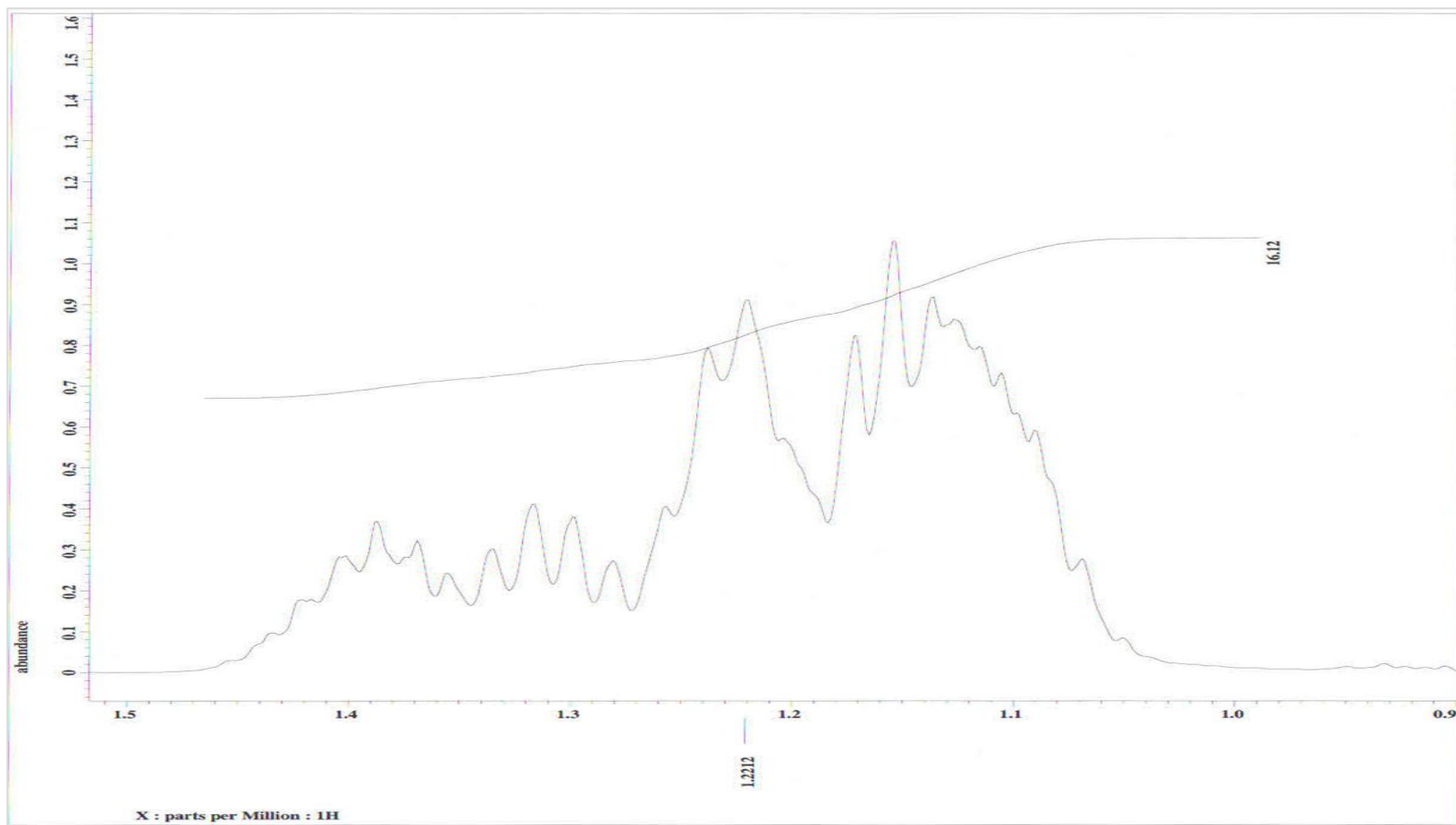


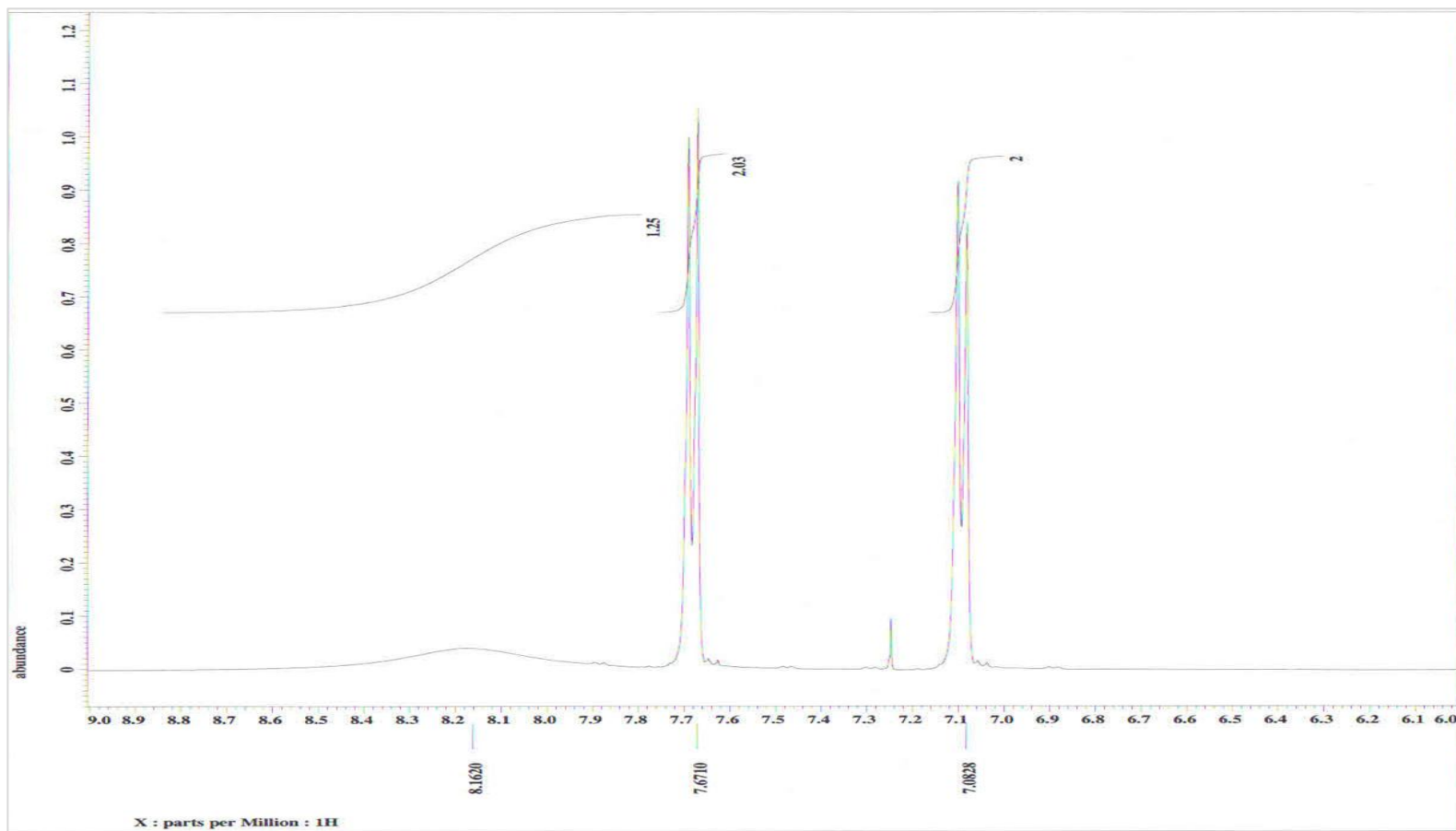
Appendix I. Proton nuclear magnetic resonance (^1H NMR) of bis-(2-ethylhexyl)ammonium tosylate.



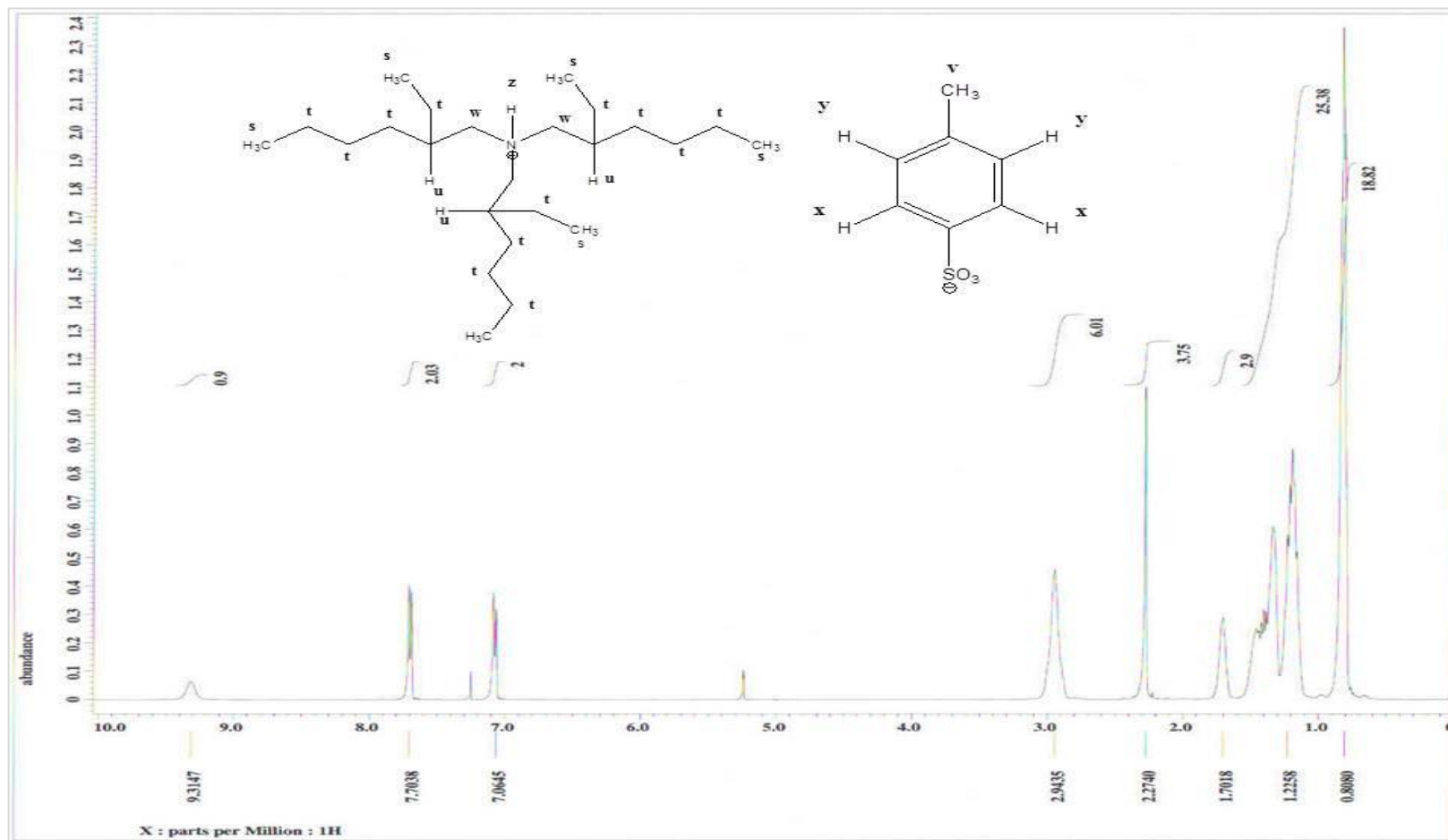
Appendix II. A close up proton nuclear magnetic resonance (^1H NMR) of BEHA tosylate spectra, peak at δ 0.7485 ppm.



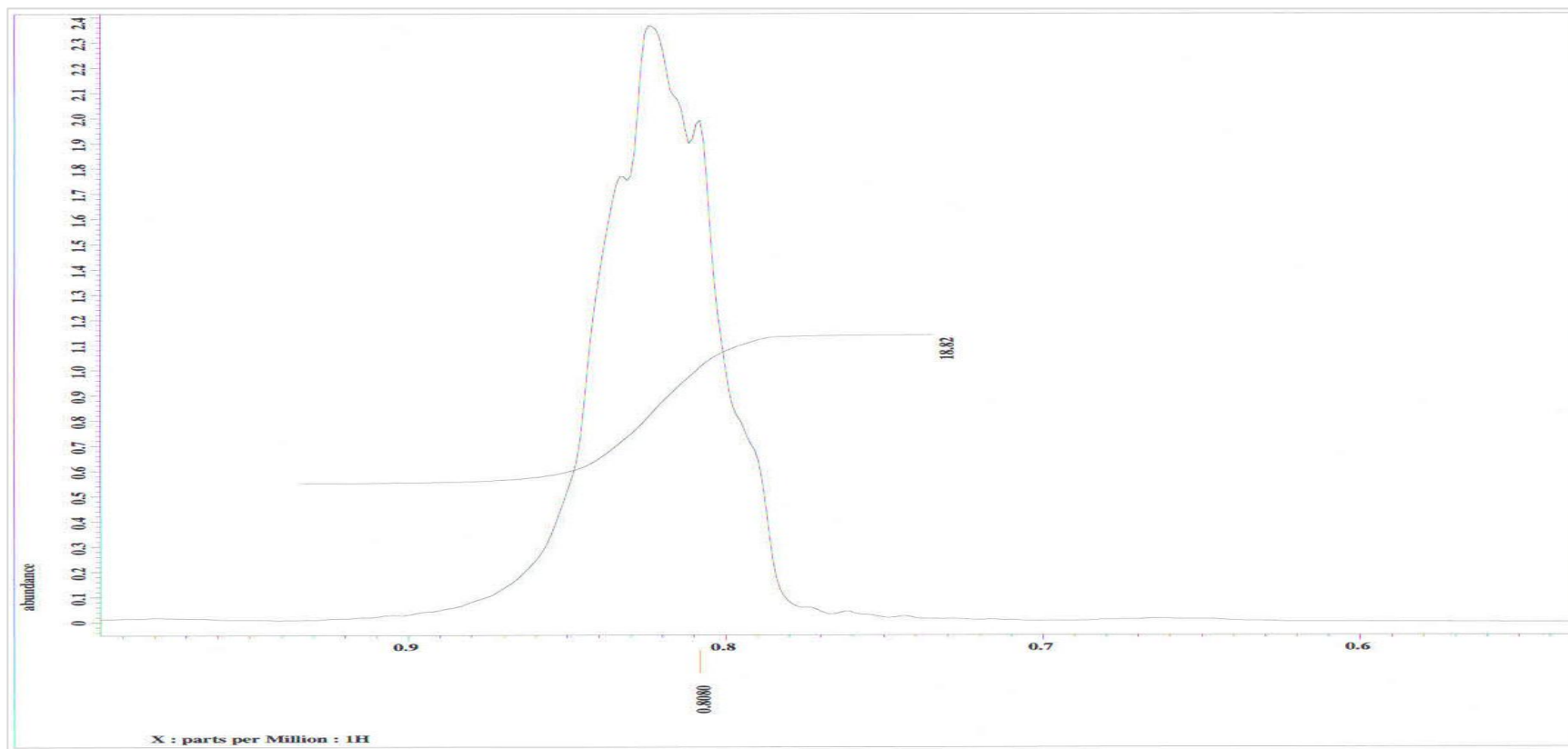
Appendix III. A close up proton nuclear magnetic resonance (^1H NMR) of BEHA tosylate spectra, peak at δ 1.2212 ppm.



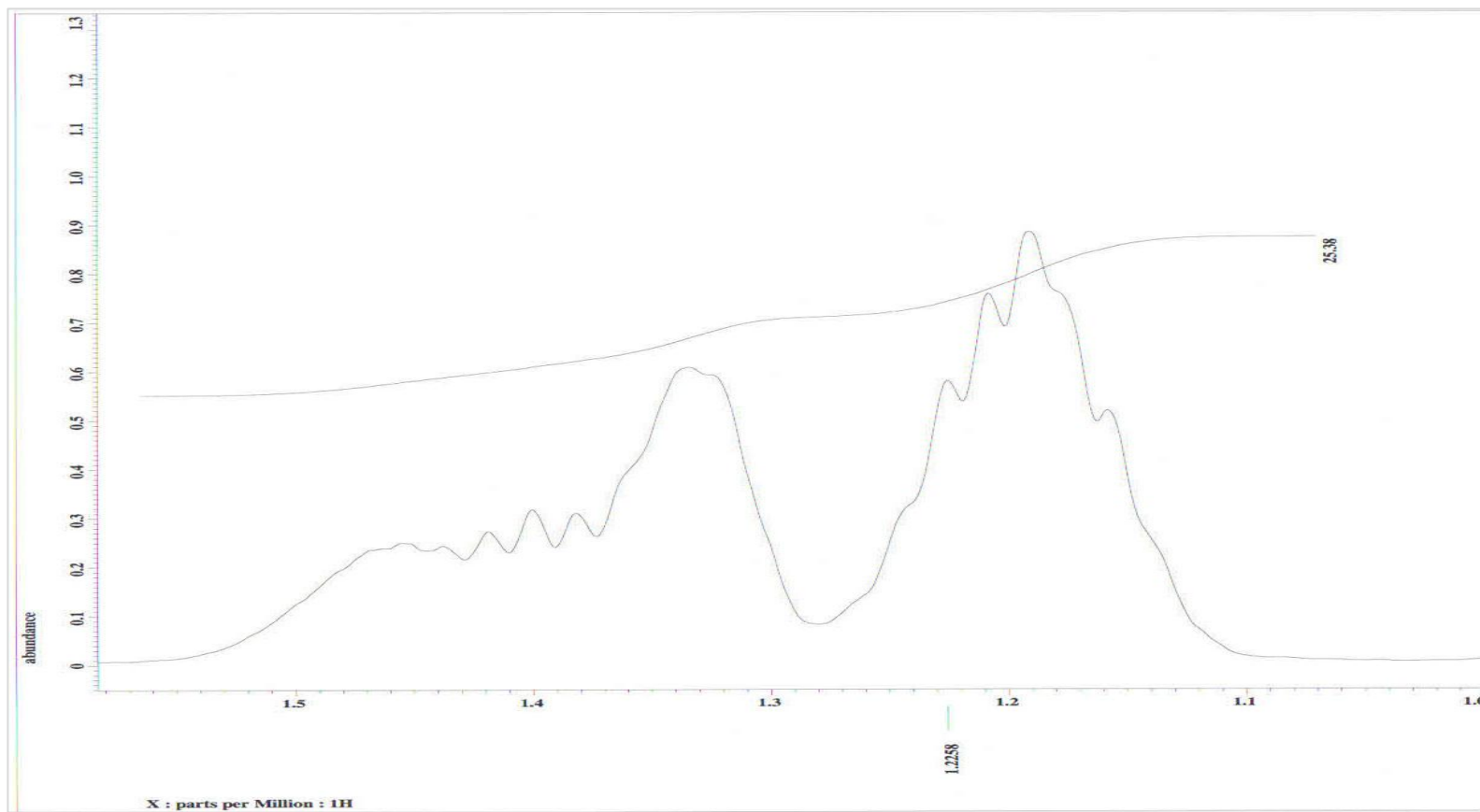
Appendix IV. A close up proton nuclear magnetic resonance (^1H NMR) of BEHA tosylate spectra, peaks at δ 7.0828 ppm, δ 7.6710 ppm and δ 8.1620 ppm.



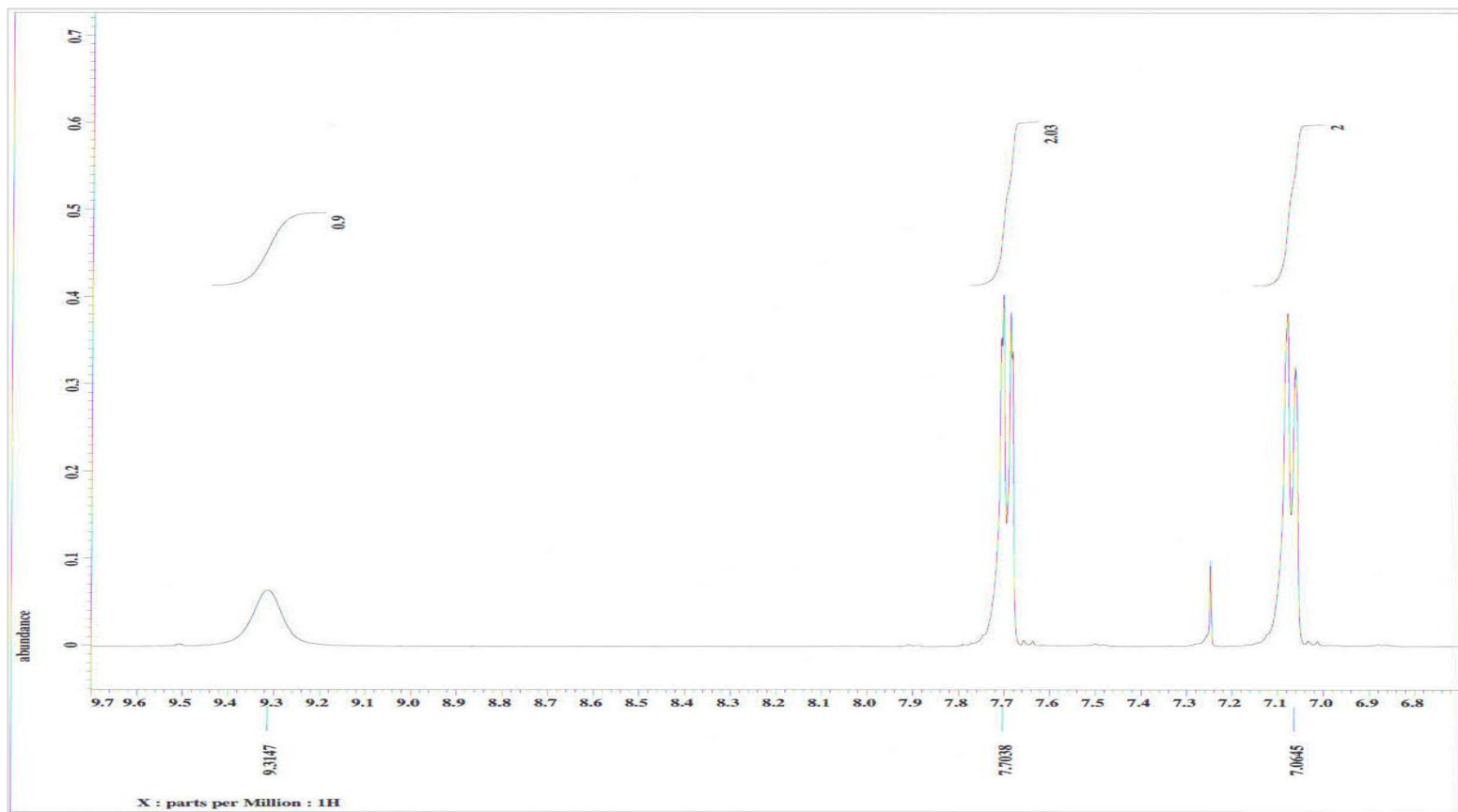
Appendix V. Proton nuclear magnetic resonance (^1H NMR) of tris-(2-ethylhexyl)ammonium tosylate.



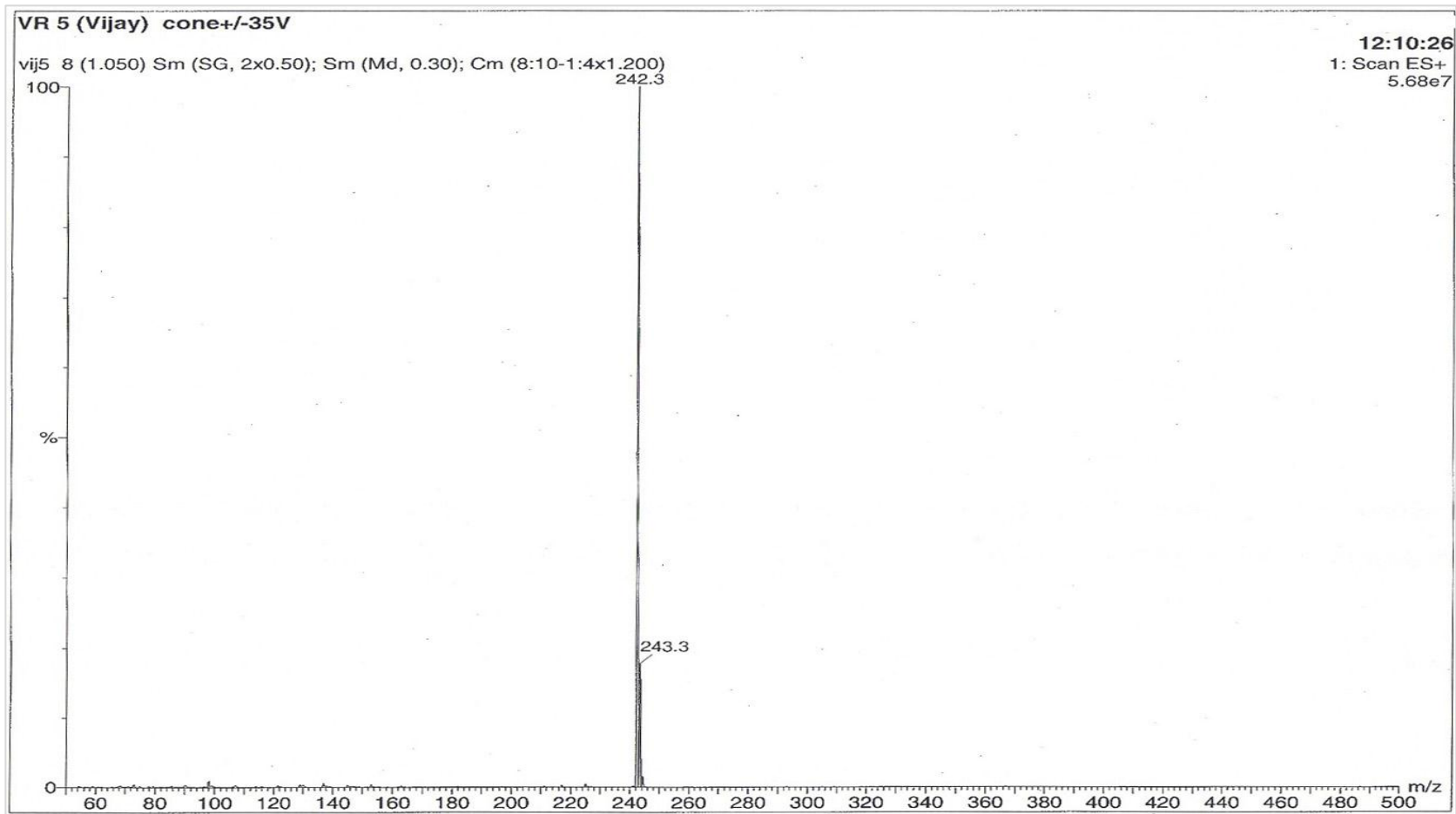
Appendix VI. A close up proton nuclear magnetic resonance (^1H NMR) of TEHA tosylate spectra, peak at δ 0.8080 ppm.



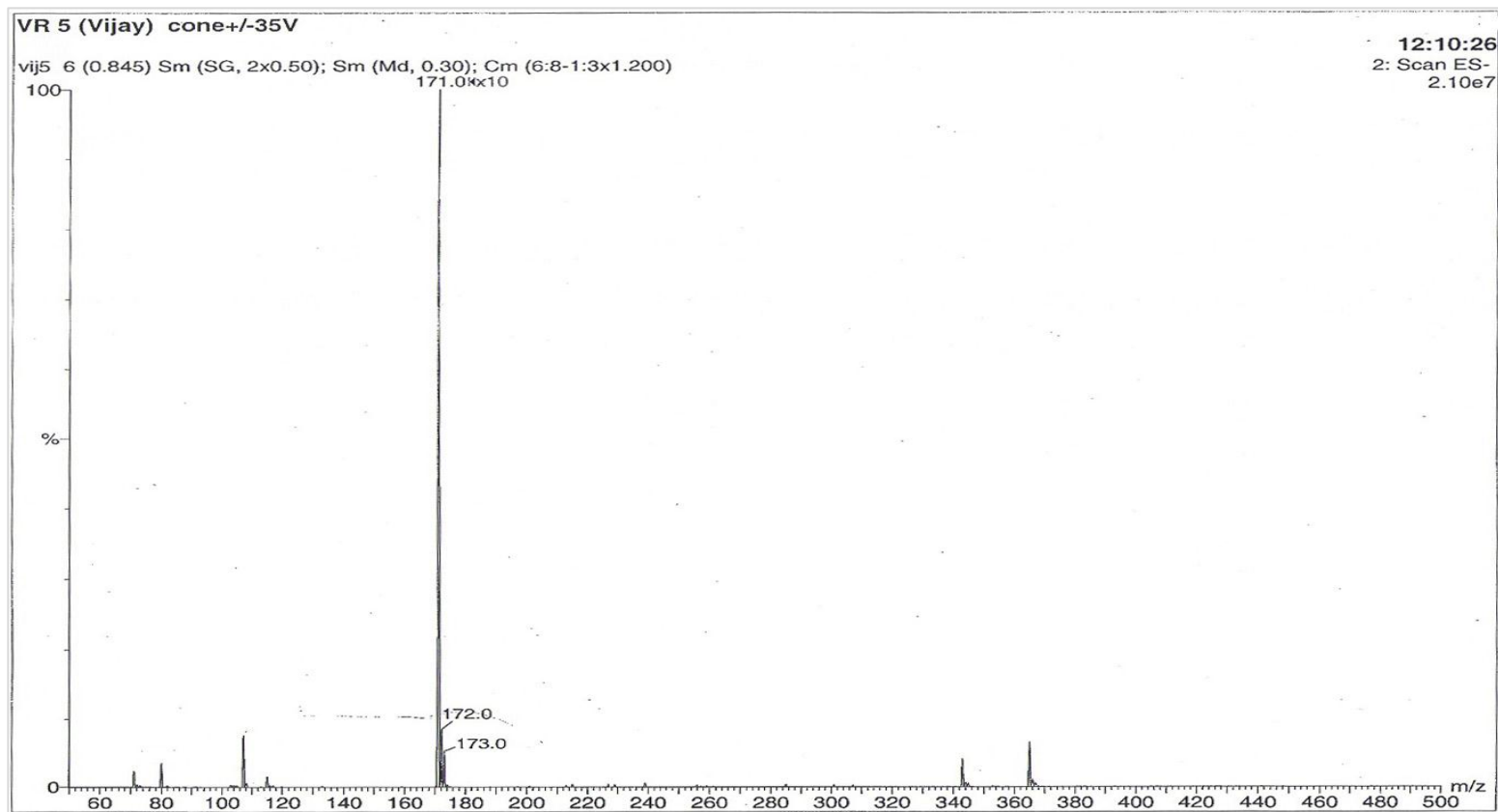
Appendix VII. A close up proton nuclear magnetic resonance (^1H NMR) of TEHA tosylate spectra, peak at δ 1.2258 ppm.



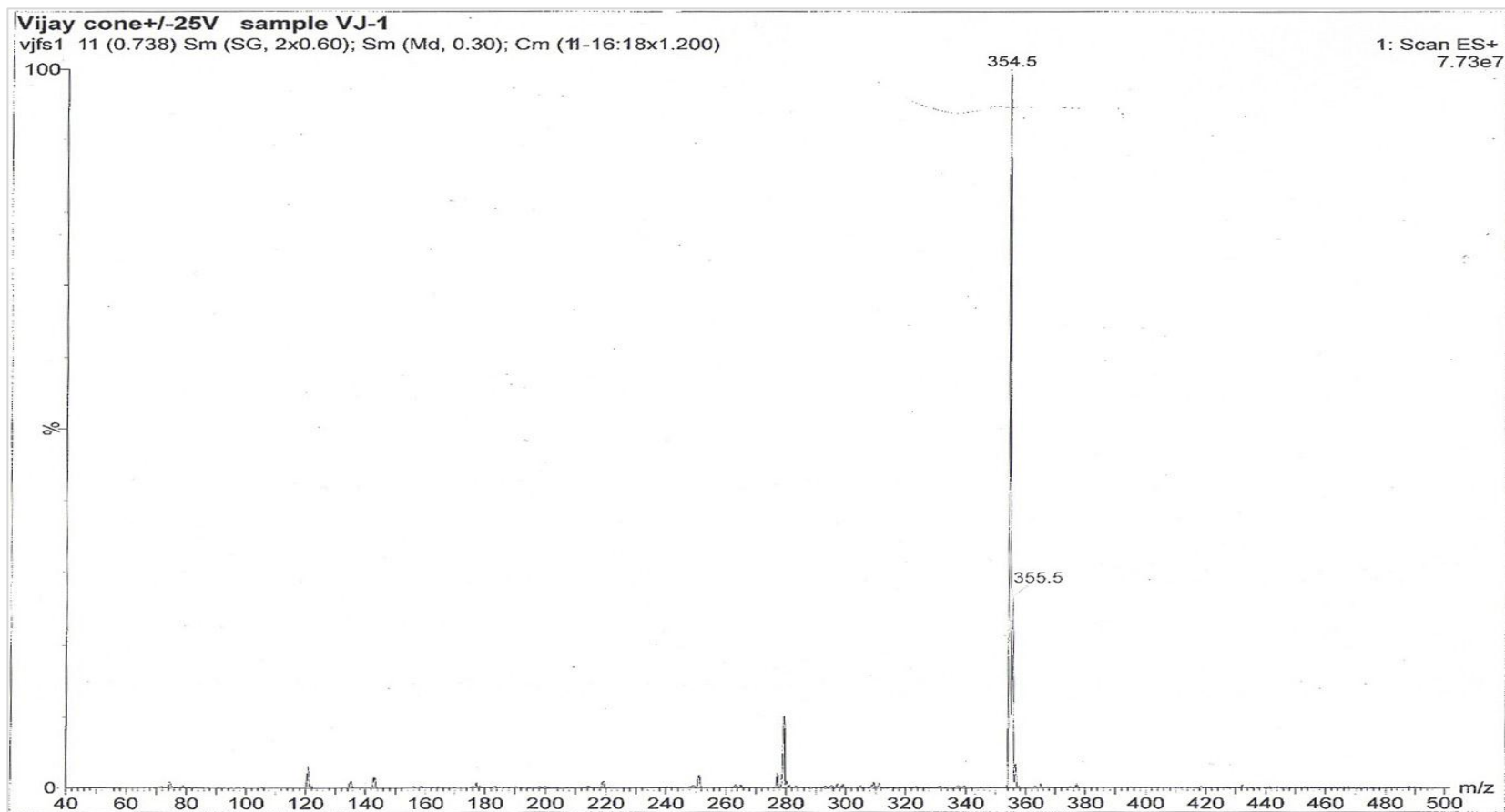
Appendix VIII. A close up proton nuclear magnetic resonance (^1H NMR) of TEHA tosylate spectra, peaks at δ 7.0645 ppm, δ 7.7038 ppm and δ 9.3147 ppm.



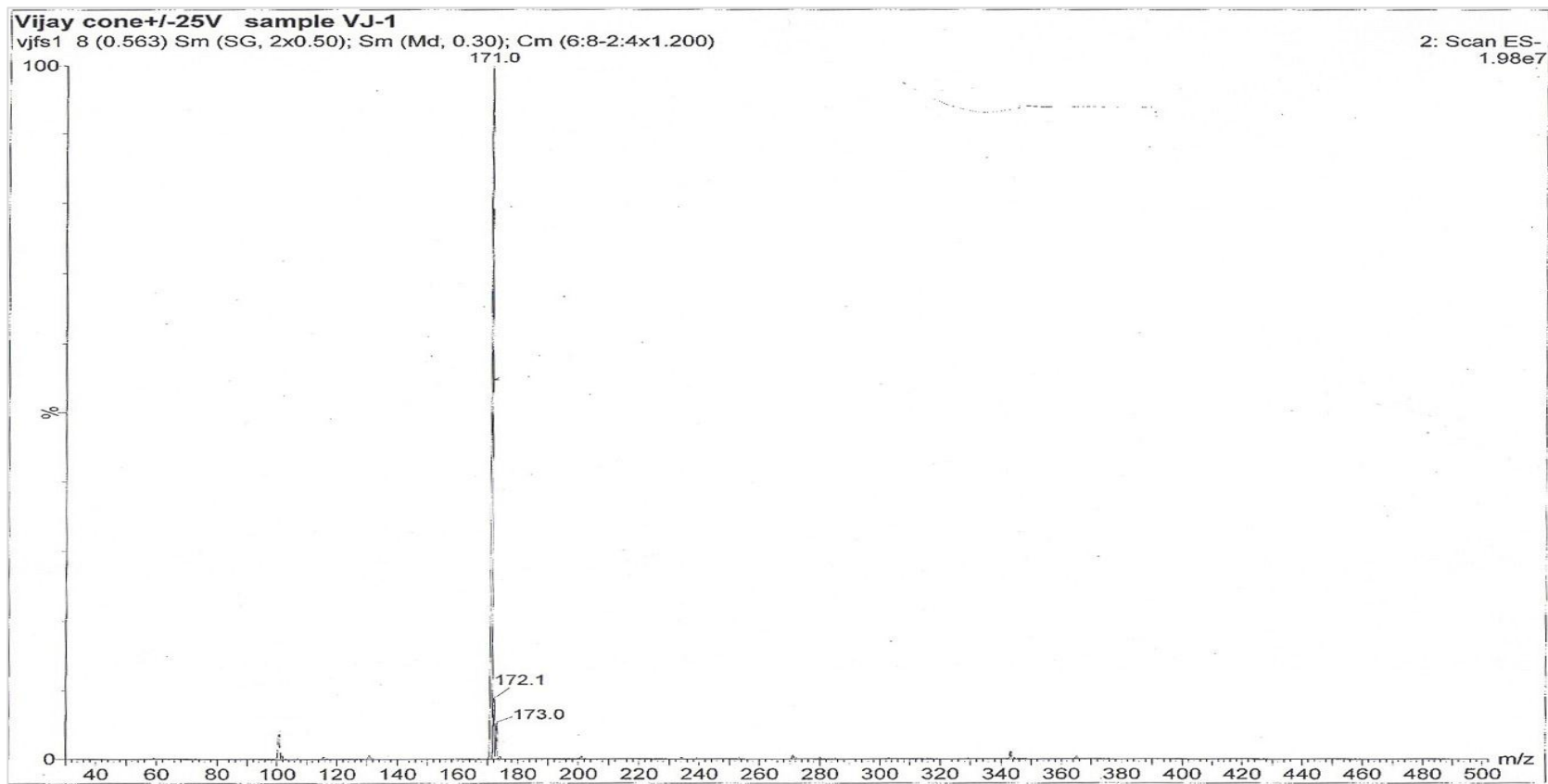
Appendix IX. Electrospray mass spectra of cation, bis-(2-ethylhexyl)ammonium for BEHA tosylate protic ionic liquid.



Appendix X. Electrospray mass spectra of anion, tosylate for BEHA tosylate protic ionic liquid.



Appendix XI. Electrospray mass spectra of cation, tris-(2-ethylhexyl) ammonium for TEHA tosylate protic ionic liquid.

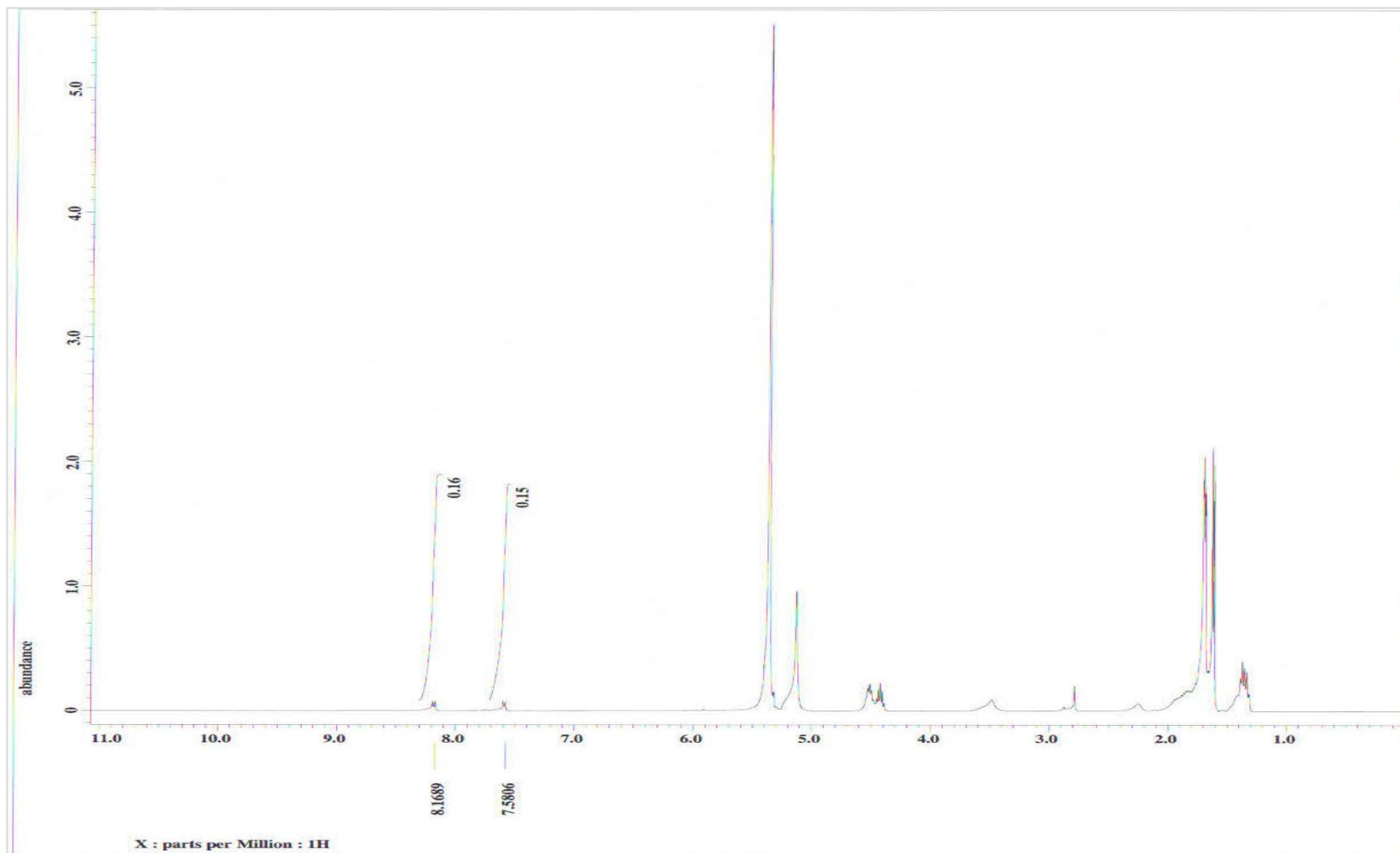


Appendix XII. Electrospray mass spectra of anion, tosylate for TEHA tosylate protic ionic liquid.

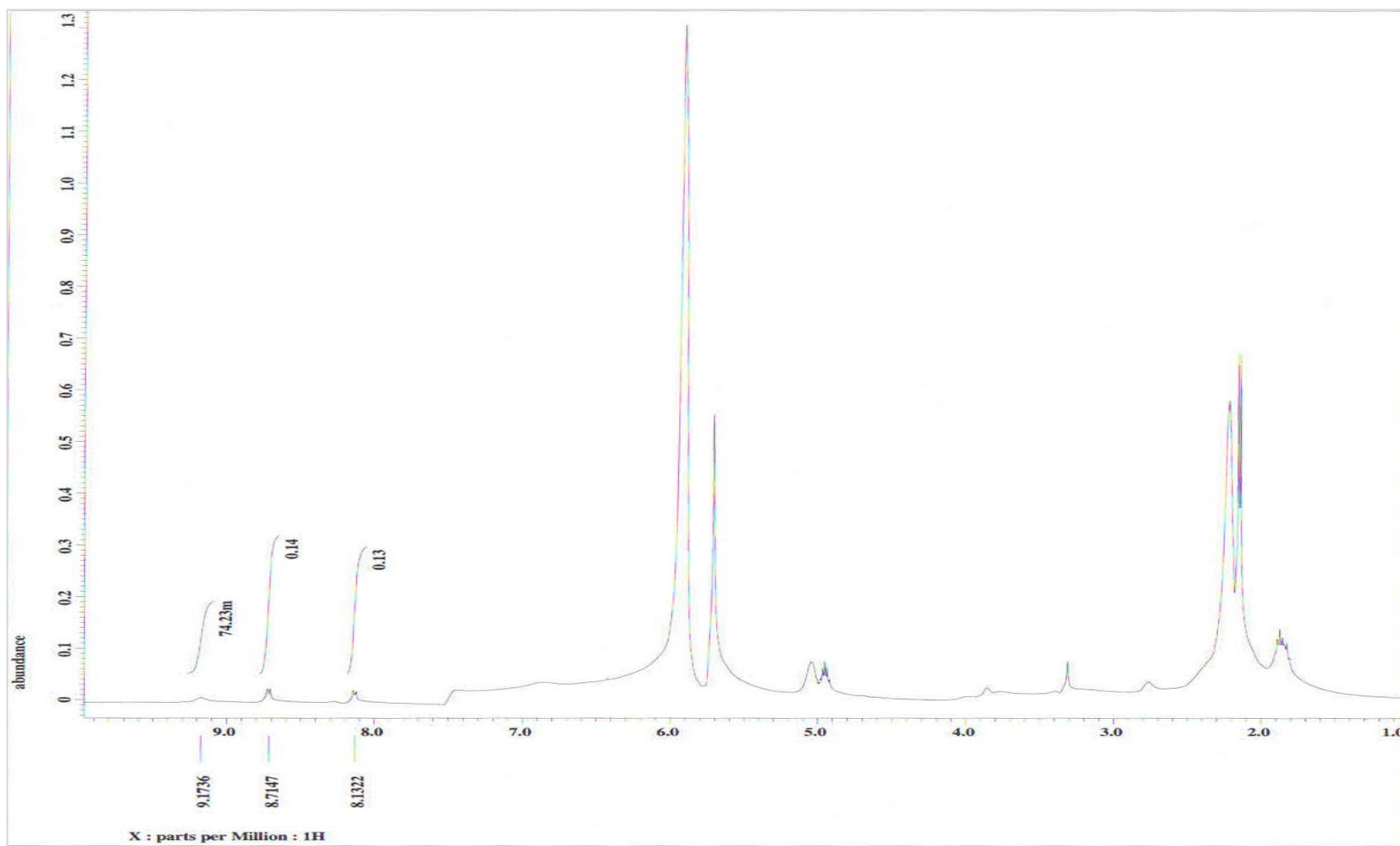
NMR spectra (Appendix no)	Sample	Weight (g)				Percentage (% w/w)			1 proton value for ionic liquid	1 proton value for water (for comparison purpose)	1 proton value for isopropanol (for comparison purpose)	reference peak value for integration purpose (1 IL proton value x 2)
		IL	Water	IPA	Total	IL	Water	IPA				
XIV	BEHA Tos + water + IPA (phase separated)	0.1027	0.1010	0.1214	0.3251	32	31	37	0.0741	1.7222	0.6156	0.1482
XV	BEHA Tos + water + IPA (phase miscibility)	0.1027	0.1010	0.1214	0.3251	32	31	37	0.0741			0.1482
XVI	BEHA Tos + water + IPA (Aqueous rich phase)	1.0610	1.0413	1.2098	3.3121	32	31	37	0.0741			0.1482
XVII	BEHA Tos + water + IPA (IL rich phase)	1.0610	1.0413	1.2098	3.3121	32	31	37	0.0741			0.1482
XVIII	BEHA Tos + IPA	0.3024	-	0.3614	0.6638	46	-	54	0.1066			0.2132
XIX	BEHA Tos + IPA+ trace of water	0.3024	0.0197	0.3614	0.6835	44	3	53	0.1019			0.2038
XXI	TEHA Tos + water + IPA (phase separated)	0.1042	0.1003	0.1210	0.3255	32	31	37	0.0588	1.7222	0.6156	0.1176
XXII	TEHA Tos + water + IPA (phase miscibility)	0.1042	0.1003	0.1210	0.3255	32	31	37	0.0588			0.1176
XXIII	TEHA Tos + water + IPA (Aqueous rich phase)	1.0194	1.0090	1.2050	3.2334	32	31	37	0.0588			0.1176
XXIV	TEHA Tos + water + IPA (IL rich phase)	1.0194	1.0090	1.2050	3.2334	32	31	37	0.0588			0.1176
XXV	TEHA Tos + IPA	0.3157	-	0.3555	0.6712	47	-	53	0.0864			0.1728
XXVI	TEHA Tos + IPA+trace of water	0.3157	0.0247	0.3555	0.6959	45	4	51	0.0827			0.1654

**reference peak is the methine (-CH) of tosylate ring near methyl group.

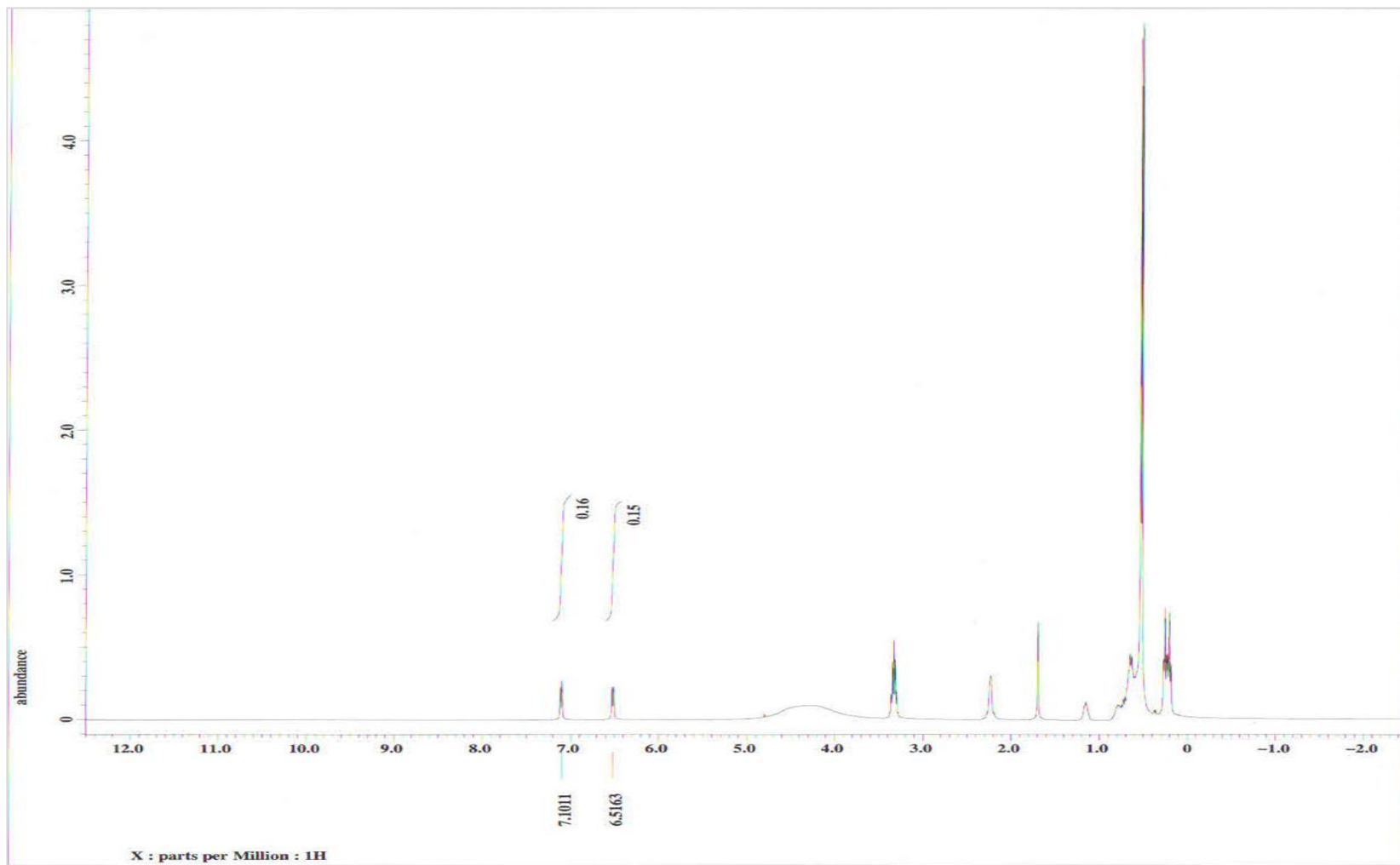
Appendix XII. Calculation details and values in determining per proton value for ¹HNMR integration.



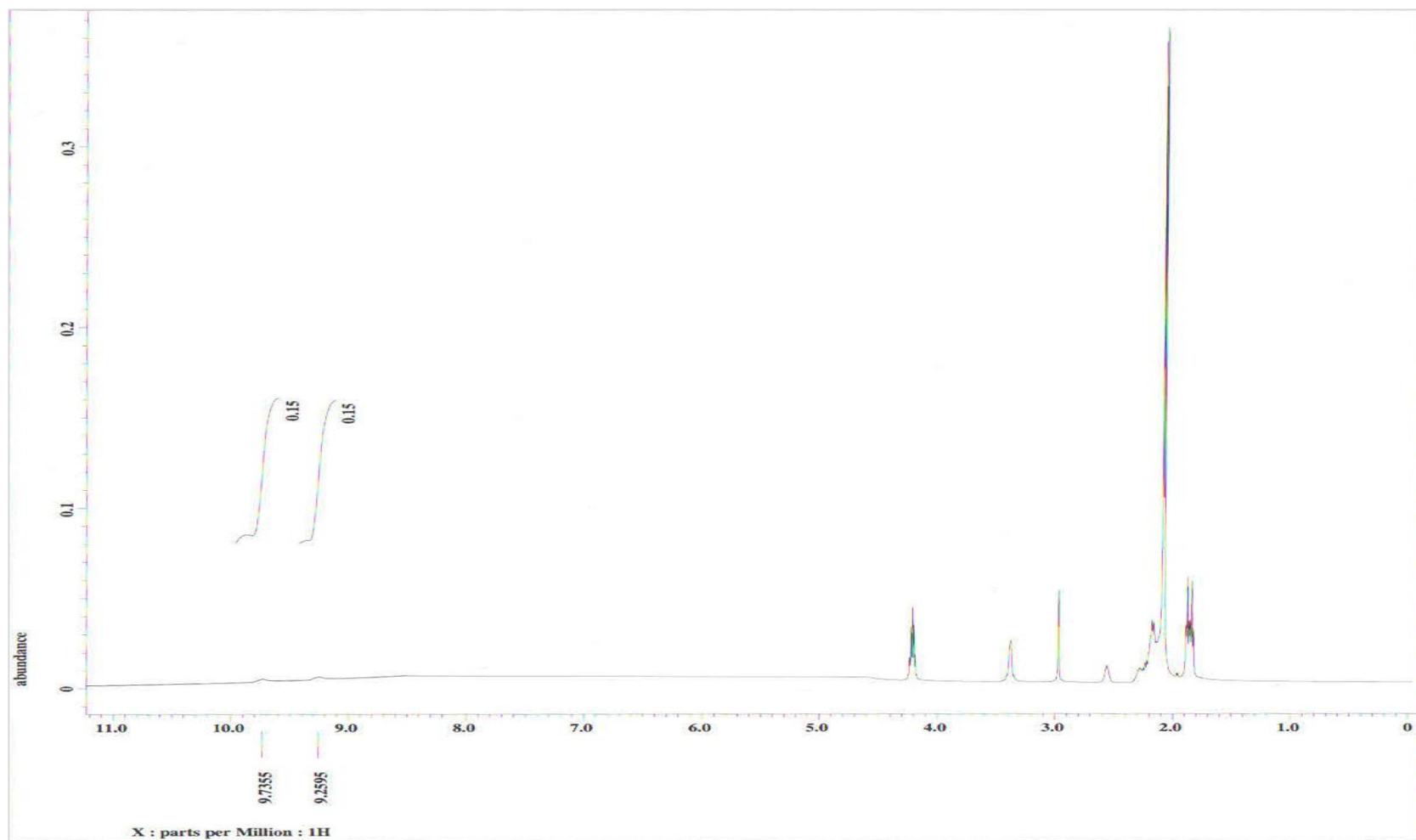
Appendix XIV. Proton nuclear magnetic resonance (^1H NMR) of BEHA tosylate/ water/ isopropanol (phase separated) spectra.



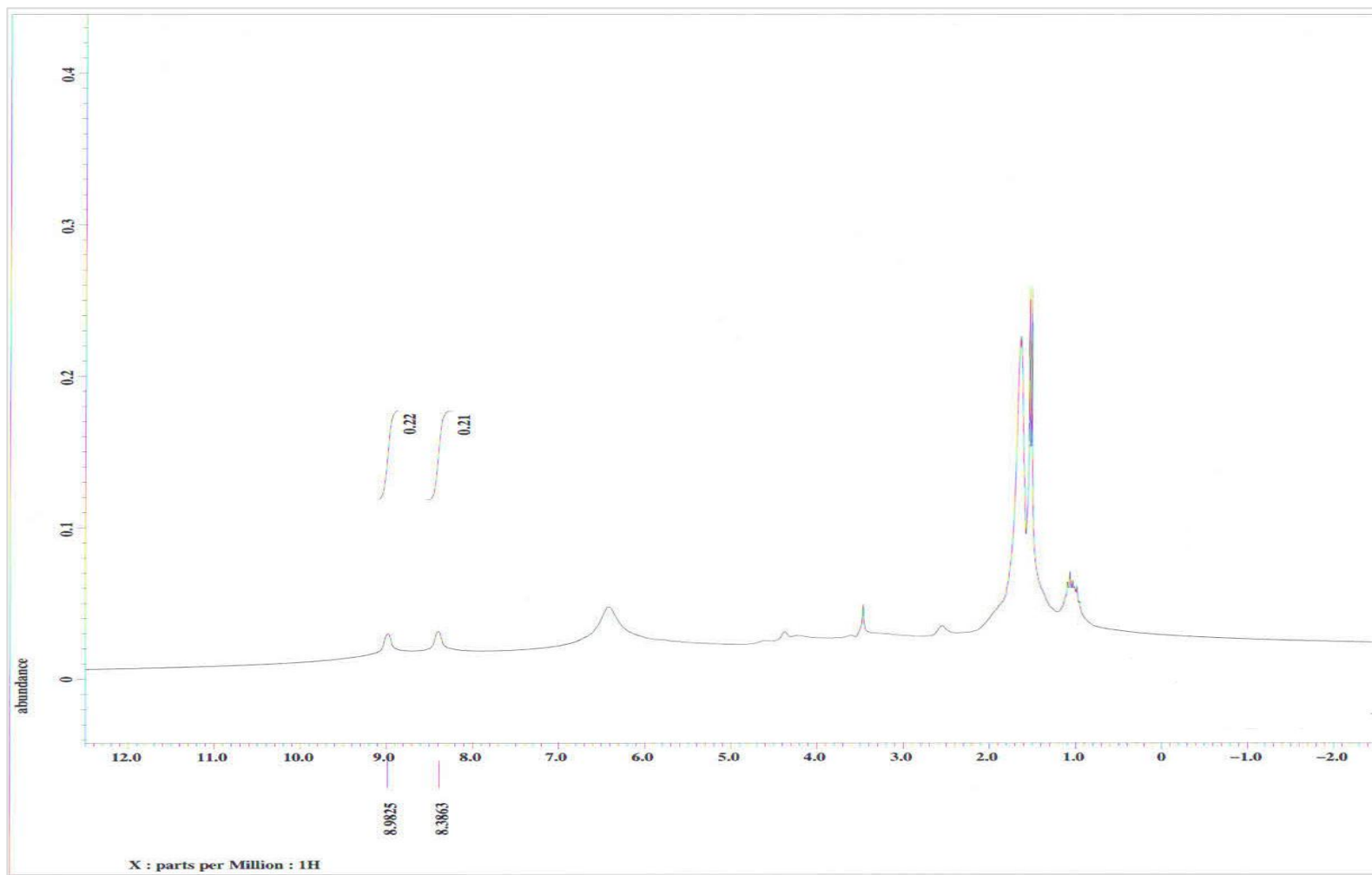
Appendix XV. Proton nuclear magnetic resonance (^1H NMR) of BEHA tosylate / water/ isopropanol (phase miscibility) spectra.



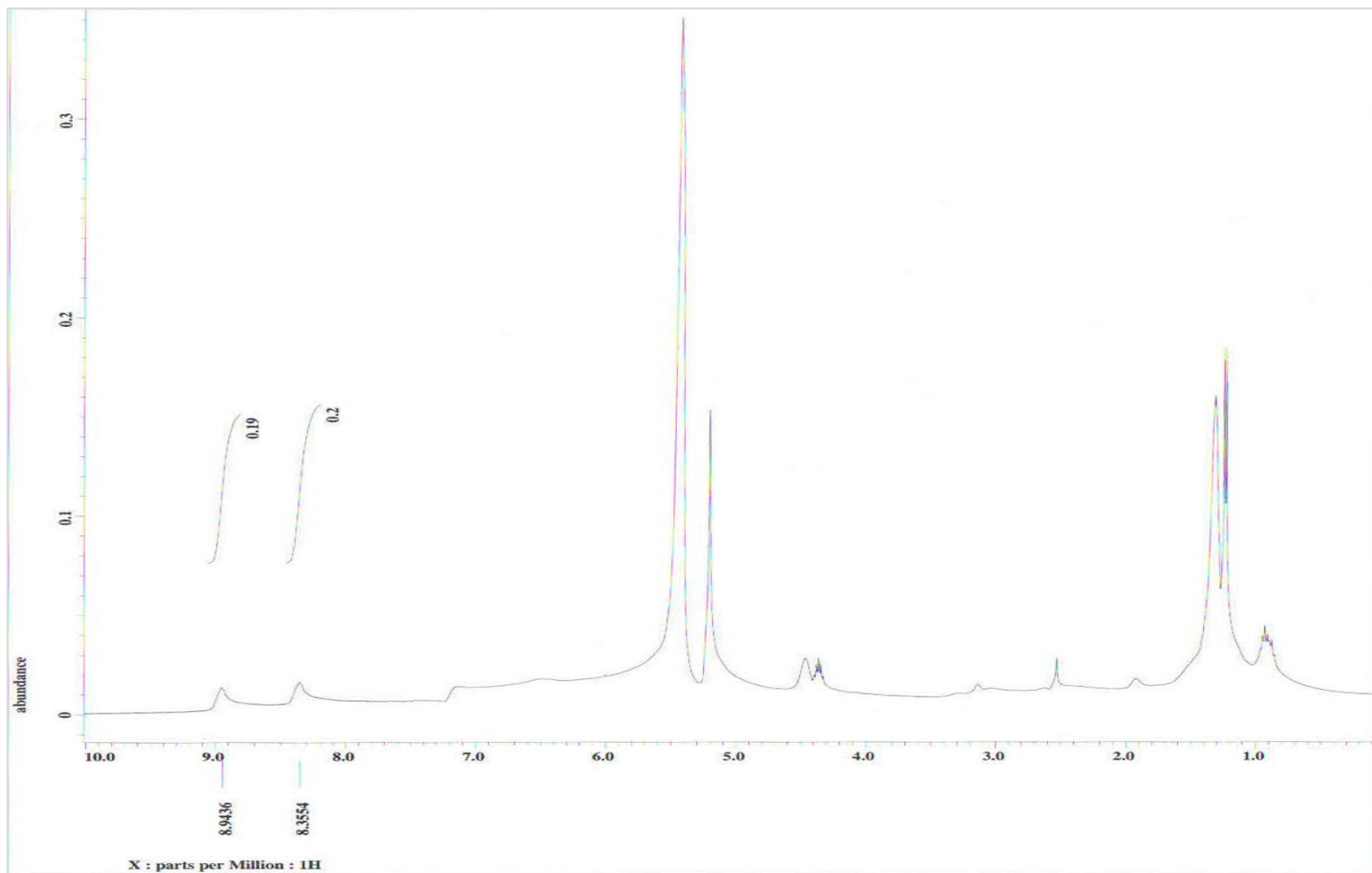
Appendix XVI. Proton nuclear magnetic resonance (^1H NMR) of BEHA tosylate / water/ isopropanol (aqueous rich phase) spectra.



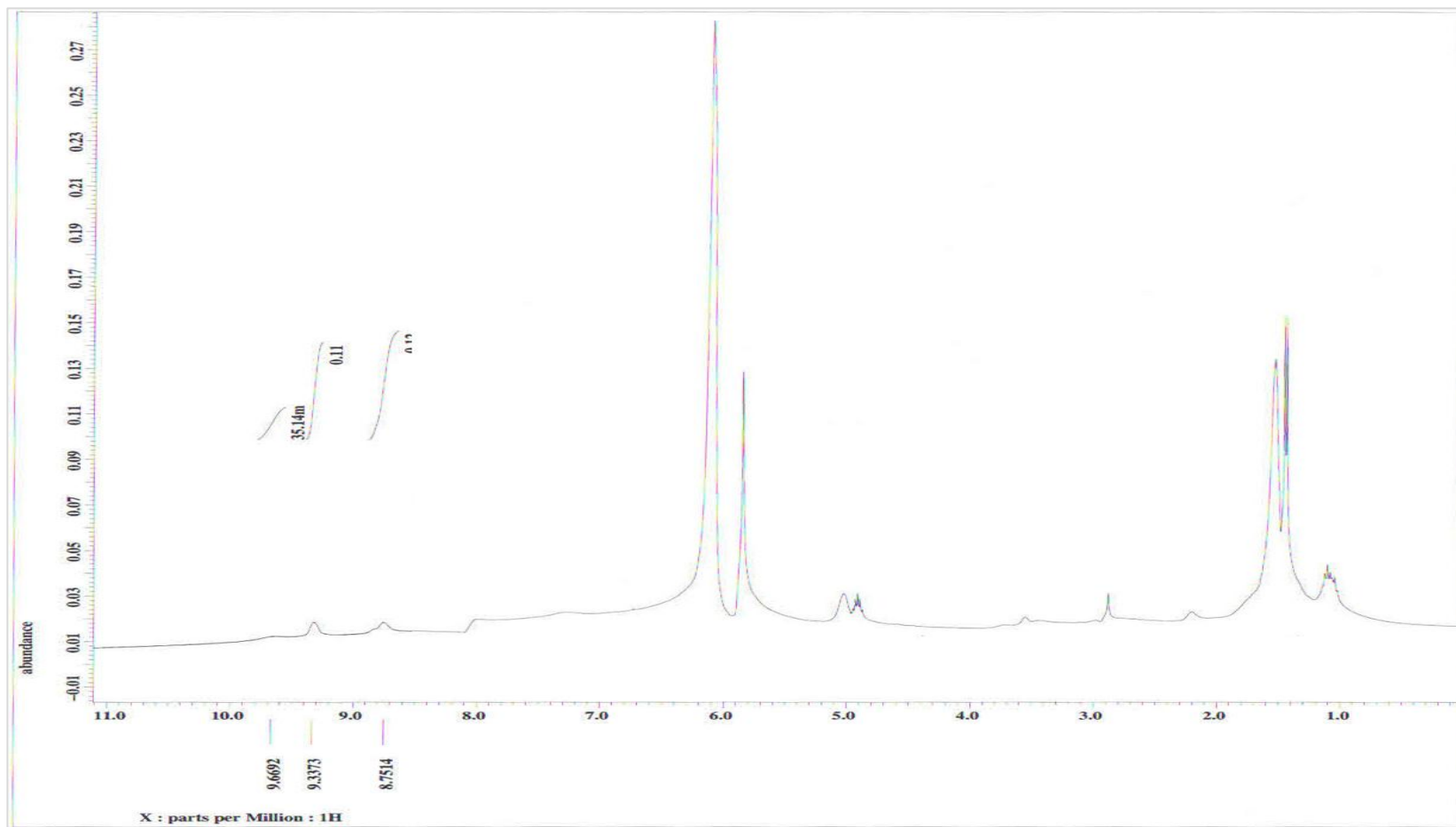
Appendix XVII. Proton nuclear magnetic resonance (^1H NMR) of BEHA tosylate / water/ isopropanol (organic rich phase) spectra.



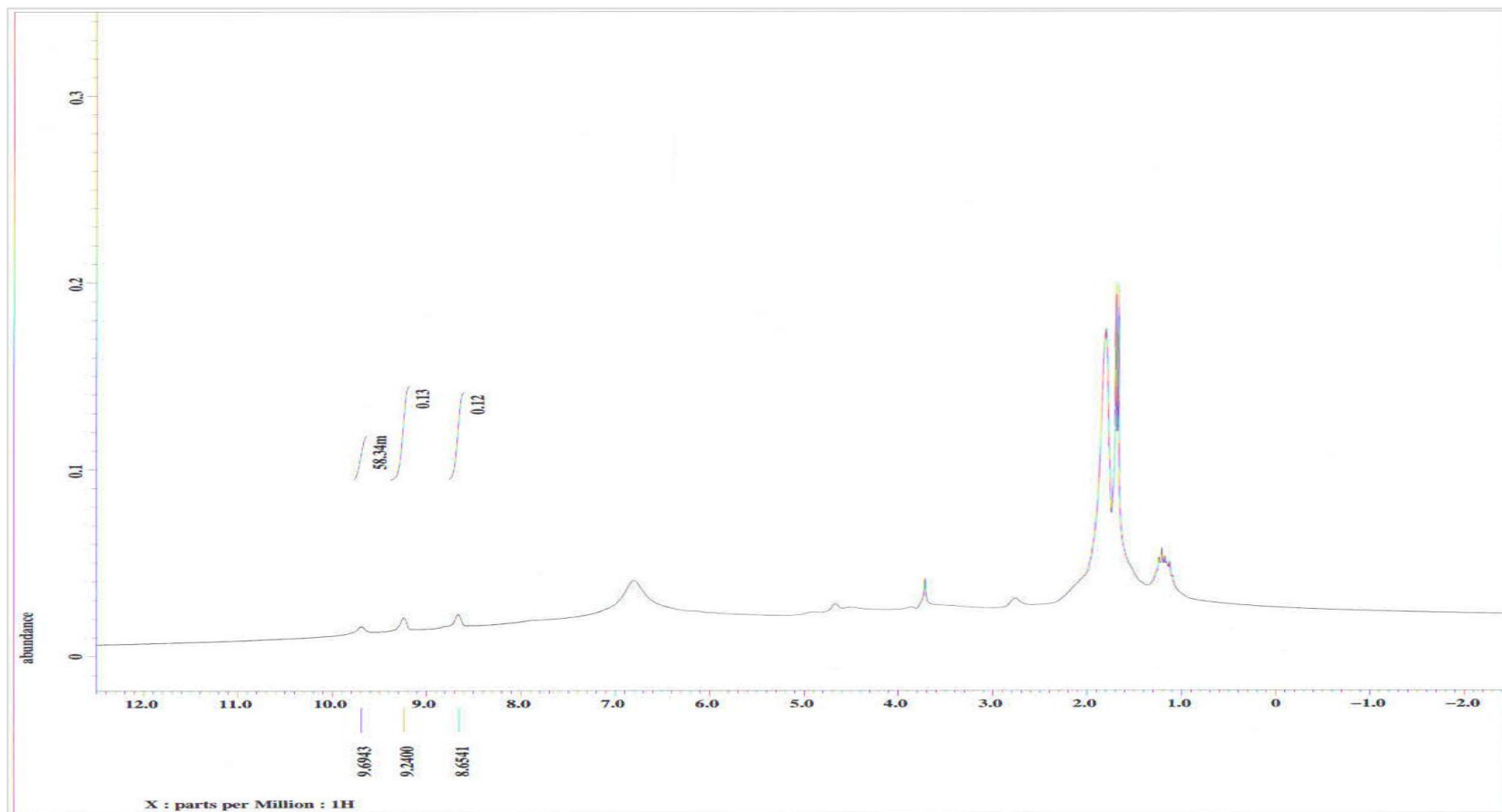
Appendix XVIII. Proton nuclear magnetic resonance (^1H NMR) of BEHA tosylate / isopropanol spectra.



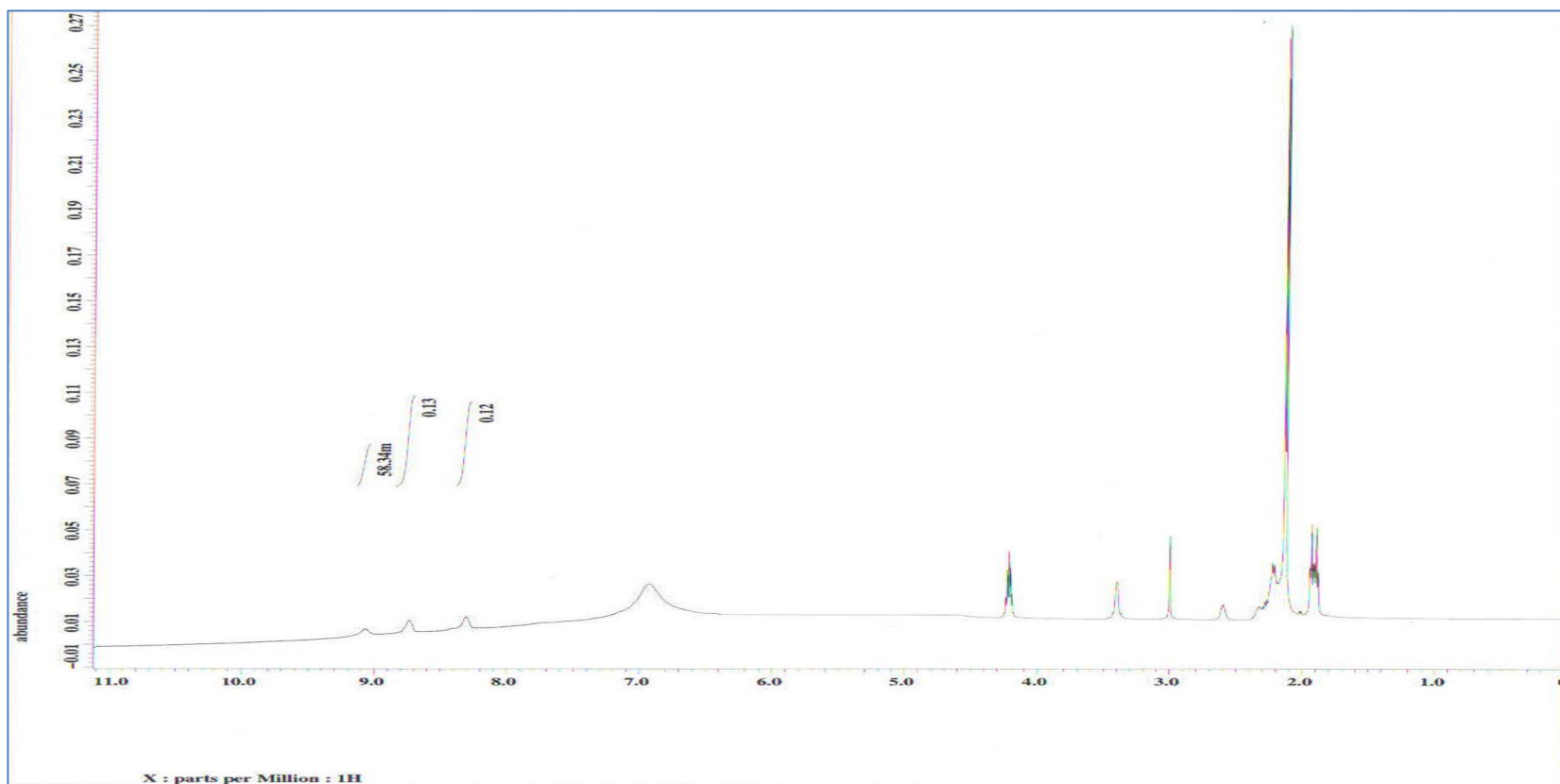
Appendix XIX. Proton nuclear magnetic resonance (^1H NMR) of BEHA tosylate / isopropanol/ trace of water spectra.



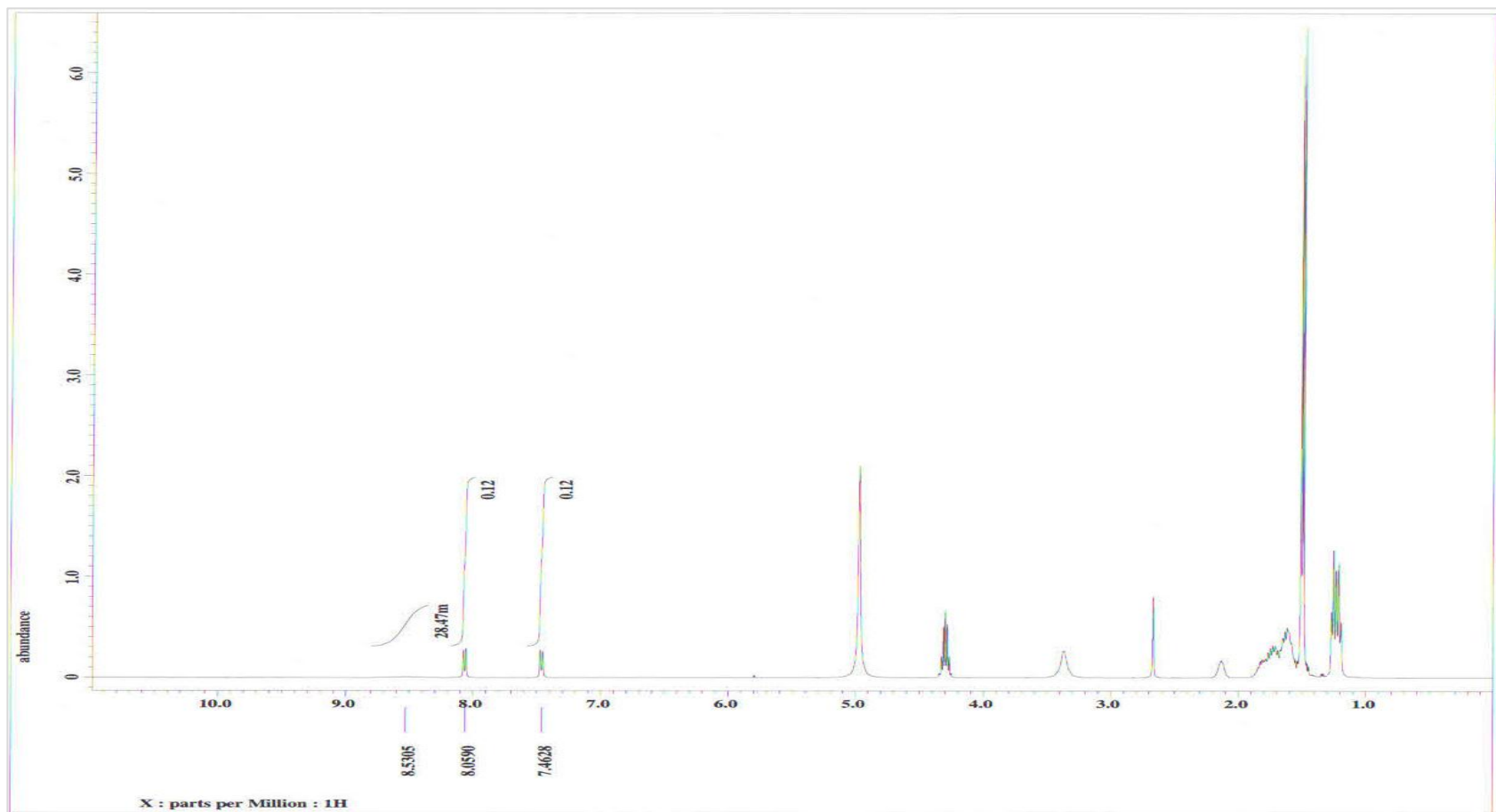
Appendix XXI. Proton nuclear magnetic resonance (^1H NMR) of TEHA tosylate/ water/ isopropanol (phase separated) spectra.



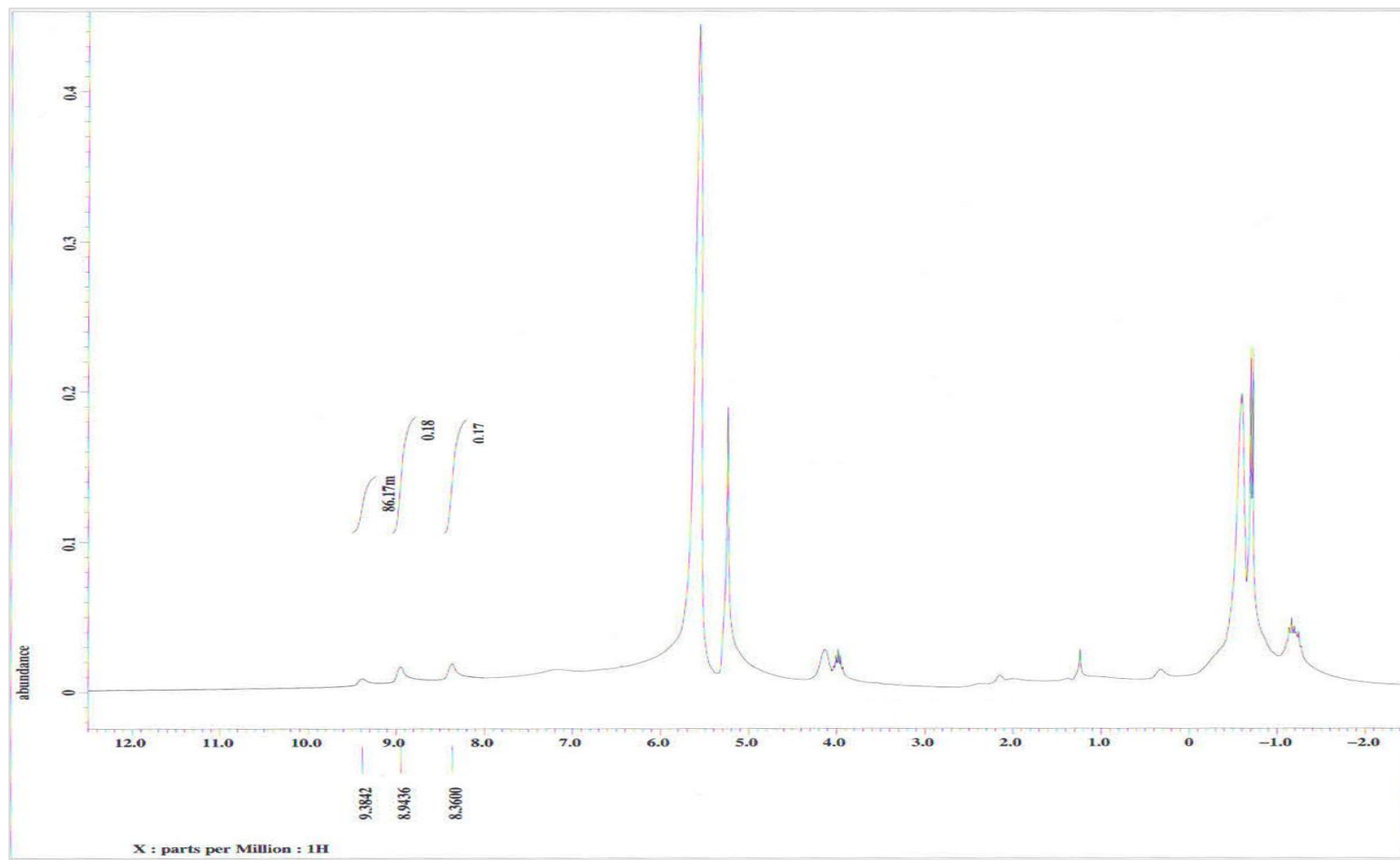
Appendix XXII. Proton nuclear magnetic resonance (^1H NMR) of TEHA tosylate / water/ isopropanol (phase miscibility) spectra.



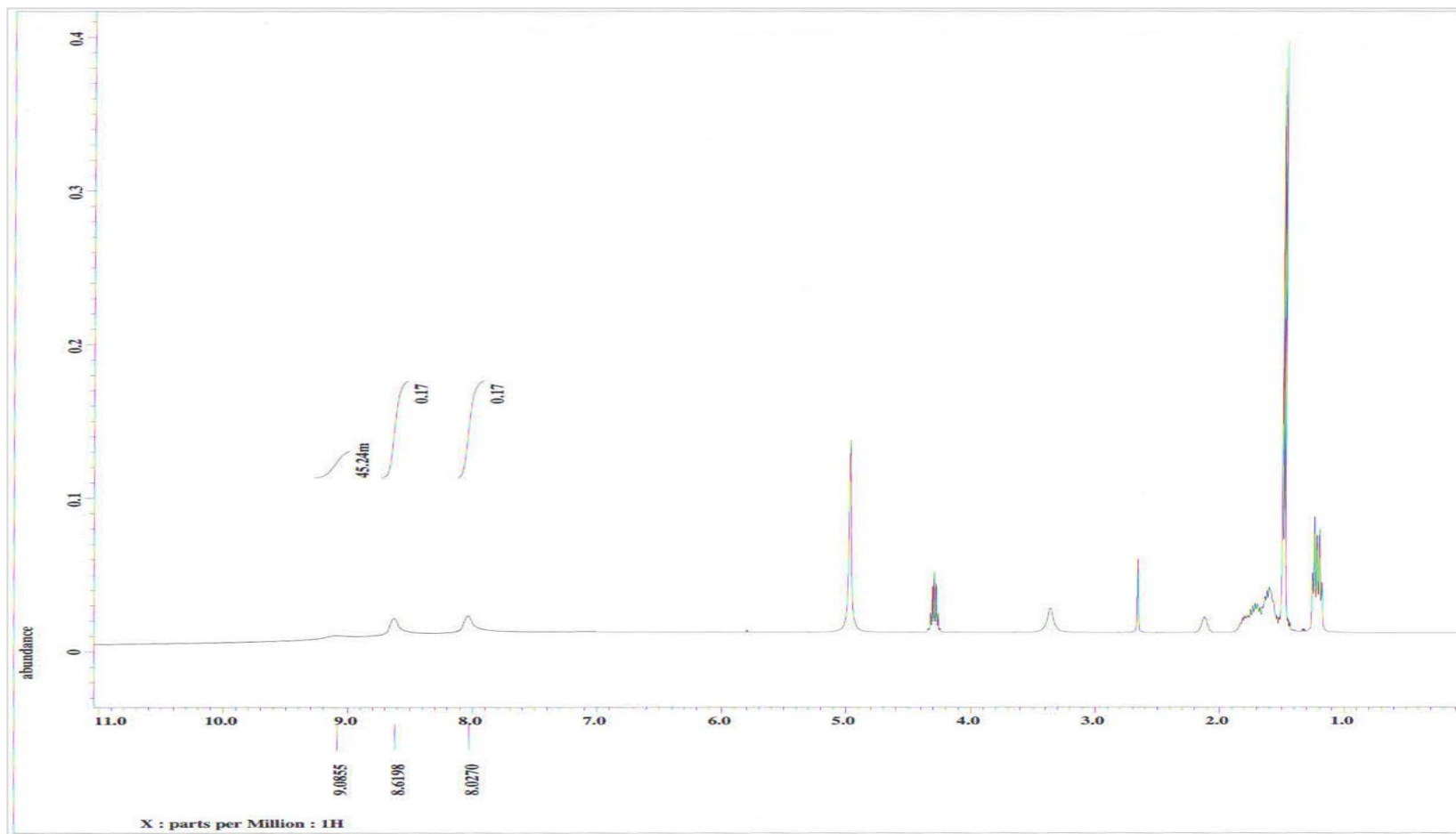
Appendix XXIII. Proton nuclear magnetic resonance (^1H NMR) of TEHA tosylate / water/ isopropanol (aqueous rich phase) spectra.



Appendix XXIV. Proton nuclear magnetic resonance (^1H NMR) of TEHA tosylate / water /isopropanol (organic rich phase) spectra.



Appendix XXV. Proton nuclear magnetic resonance (^1H NMR) of tris-(2-ethylhexyl)ammonium tosylate/ isopropanol spectra.



Appendix XXVI. Proton nuclear magnetic resonance (^1H NMR) of TEHA tosylate / isopropanol spectra/ trace of water.